SCHOOL OF BIOLOGICAL AND LIFE SCIENCES

PHD ENTRANCE SYLLABUS WINTER 2023-24

Ph.D. Biochemistry

Chemical bonding and stereochemistry: Structure of atoms, molecules and chemical bonds Chirality and stereoisomerism

Biomolecules: Classification, composition, structure, properties, functions and uses of carbohydrates, proteins, lipids, nucleic acids and Vitamins and Minerals.

Enzymology: Definition, classification, and nomenclature of enzymes. Enzyme assay techniques, enzyme catalysis and enzyme kinetics. Study of Michaelis Manton equation, lb plot and their significance. Enzyme inhibition. Active site conformation and active site investigation. Activity mechanisms of RNAse, chymotrypsin and carboxypeptidase.

Bioenergetics and Metabolism: Carbohydrate Metabolism - catabolism of starch, glycolysis, TCA cycle, pentose phosphate pathway and gluconeogenesis, Amino Acid Metabolism - biosynthesis and degradation of aromatic amino acids and alpha-glutarate family amino acids. Lipid Metabolism – biosynthesis and degradation of even chain fatty acids, tag and structural lipids, Nucleotide Metabolism –biosynthesis and biodegradation of purine and pyramidine nucleotides.

Molecular Biology: DNA Replication - evidence of semiconservative mode of DNA replication. Prokayotic and Eukaryoyic replication, Transcription - transcription factors, mechanism of transcription in Prokaryotes and eukaryotes, Translation - translation factors, mechanism and process of protein synthesis in Prokaryotes and eukaryotes.

Immunology: Immunity, types of immunity, immune responsiveness, humoral immune response, specific and non-specific cell mediated immune response, effector- molecules and cells of immune response. Split-gene concept of immunoglobulin genes, MHC and its significance in immune response.

Biochemical & Biophysical Techniques: Principles of biophysical chemistry (pH,buffer, Reaction kinetics, thermodynamics, colligative properties). Animal Tissue Culture, Plant Tissue Culture, rDNA Technology, Genomics and Proteomics, Genetic Engineering, Fluorescence and Absorbance Spectroscopy, Microscopy,

Biostatistics & Ecological Principles: Hypothesis testing, T -test, Anova, Correlation and regression, Distribution, Mean, median, mode, standard deviation, error, Probability. Species interactions, population ecology, community ecology, conservation biology, biodiversity management.